

Benchmarking for Performance and Risk

Presentation to CDIAC

By:

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What is a benchmark

- **bench·mark** _ **PPronunciation Key** (be^nch märk)*n.*
- A standard by which something can be measured or judged. See Synonyms at standard. **Synonyms:** *standard, benchmark, criterion, gauge, measure, touchstone, yardstick*
- often **bench mark** A surveyor's mark made on a stationary object of previously determined position and elevation and used as a reference point in tidal observations and surveys.
- *tr.v.* **bench·marked, bench·mark·ing, bench·marks**
 - To measure (a rival's product) according to specified standards in order to compare it with and improve one's own product.

Key Terms for Benchmarks when Managing Investments

- Previously Determined
- Standard
- To Measure
- Compare to Improve
- Stationary
- Gauge

Why do investors use benchmarks?

- Compare Returns: Are your assets performing the way they should relative to the benchmark?
- Compare Risk: Are your investments priced correctly compared to benchmark?
- Accountability
- Improved communication
- Guidelines that provide peace of mind.

Who uses benchmarks?

- *Retirement Investments*: Compare performance of your investment choices to S&P 500
- *Money Managers*: Compare funds that they manage to industry standards
- *Public Fund Investors*: Compare core operating funds to the market standards
 - Core operating are funds that are not used for daily cash flow (liquidity portion) needs.
Example: 100MM Portfolio Size
Minimum balance over 2 years- 50MM
Then 50MM is the core

What are market standards for operating funds of public entities?

- State Pool returns
- Merrill/Lehman/Soly Treasury Indexes
 - Merrill Indices on Bloomberg IND <GO>
 - Merrill 0-1 year-Symbol:G0Q4
 - Merrill 0-3 year – Symbol:G1QA
 - Merrill 1-3 year –Symbol: G102
 - Merrill 1-5 year –Symbol:GVQA
 - Merrill 1-3 Govt/Corp-A rated+ – Symbol B110
 - Merrill 1-5 Govt/Corp-A rated+ – Symbol BV10
- Combination of above

Merrill 1-3 Treasury Only

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Index Characteristics <Page> for more

Index:	G102	U.S. Treasuries, 1-3 Yrs				
Date :	10/20/2003	Inception:	12/31/1975	Daily Availability:		
Proj Rebalancing		Oct Market Change			9/30 Rebalancing	
		OctIndex	OctIndex	MTD Chg	SepIndex	ME Chg
		10/20/03	09/30/03	10/20/03	09/30/03	09/30/03
Valuations:	USD	terms (MYN)				
	# of Issues	31	31	0	30	1
	Par Amount	735966	735966	0	716600	19366
	Market Val	759433	764715	-5282	745286	19429
	Accr Int	8518	7091	1426	7099	-7
	Cash	0	0	0	610	-610
	Full Value	767951	771807	-3856	752997	18810
	% Val in G000	36.540	35.982	0.558	36.020	-0.038
Risk Measures:	Basis of calculation- E ffective S emi-annual					
	Maturity-Wkout	1.683	1.740	-0.056	1.679	0.060
	Yield	1.681	1.349	0.331	1.326	0.023
	Modified Dur	1.616	1.673	-0.058	1.614	0.059
	Convexity	0.037	0.040	-0.002	0.038	0.002
Spread						
	Opt Adj Spread	-3	-4	1	-4	0
	Asset Swap	-32	-27	-5	-27	0

Australia 61 2 9777 8600

Brazil 5511 3048 4500

Europe 44 20 7330 7500

Germany 49 69 920410

Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2003 Bloomberg L.P.
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Returns Merrill 1-3 Year Treasury

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MERRILL LYNCH INDICES

Monthly Return Currency Percent Hedged ☐

U.S. Treasuries, 1-3 Yrs

	Total Return		Price Return	
	Periodic	Annualized	Periodic	Annualized
1 mon retn	0.908	11.626	0.624	7.865
3 mon retn	0.426	1.702	-0.467	-1.839
6 mon retn	1.147	2.300	-0.705	-1.402
1 yr. retn	2.622	2.622	-1.337	-1.337
Y-T-D retn	1.740	2.334	-1.134	-1.513
Index Val.	882.578		123.730	

Total Return Inception:

Price Return Inception:

Australia 61 2 9777 8600

Brazil 5511 3048 4500

Europe 44 20 7330 7500

Germany 49 69 920410

Hong Kong 852 2977 6000

Japan 81 3 3201 8900

Singapore 65 6212 1000

U.S. 1 212 318 2000

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Merrill 1-3 Govt/Corp A+ or better

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Index Characteristics		<Page> for more			
Index: B110	U.S. Corporate & Government, 1-3 Yrs, A Rated and above				
Date : 10/20/2003	Inception:12/31/1996		Daily Availability:12/31/1996		
Proj Rebalancing	Oct Market Change		9/30 Rebalancing		
	OctIndex	OctIndex	MTD Chg	SepIndex	ME Chg
	10/20/03	09/30/03	10/20/03	09/30/03	09/30/03
Valuations: USD terms (MYN)					
# of Issues	962	962	0	989	-27
Par Amount	1407497	1407497	0	1389364	18133
Market Val	1460414	1471307	-10892	1452249	19057
Accr Int	16079	14568	1510	14648	-79
Cash	1634	0	1634	2631	-2631
Full Value	1478128	1485876	-7747	1469530	16346
% Val in B010	34.155	33.709	0.446	33.755	-0.046
Risk Measures: Basis of calculation- E ffective S emi-annual					
Maturity-Wkout	1.744	1.770	-0.026	1.705	0.065
Yield	1.909	1.569	0.340	1.539	0.030
Modified Dur	1.683	1.712	-0.029	1.642	0.070
Convexity	-0.042	-0.036	-0.006	-0.038	0.002
Spread					
Opt Adj Spread	12	11	1	11	0
Asset Swap	-19	-14	-5	-13	-1
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410 Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2003 Bloomberg L.P. G956-98-3 21-Oct-03 11:17:15					

Returns Merrill 1-3 Year Govt/Corp

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MERRILL LYNCH INDICES

Monthly Return

Currency

Percent Hedged

B110 U.S. Corporate & Government, 1-3 Yrs, A Rated and above

	Total Return		Price Return	
	Periodic	Annualized	Periodic	Annualized
1 mon retn	0.981	12.610	0.663	8.371
3 mon retn	0.429	1.711	-0.561	-2.206
6 mon retn	1.332	2.673	-0.685	-1.362
1 yr. retn	3.160	3.160	-1.112	-1.112
Y-T-D retn	2.092	2.807	-1.018	-1.359
Index Val.	150.019		102.363	

Total Return Inception:

Price Return Inception:

Australia 61 2 9777 8600

Brazil 5511 3048 4500

Europe 44 20 7330 7500

Germany 49 69 920410

Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000

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Integrating benchmarks into your investment process

Concept of benchmark is not new. Public fund investors are integrating them into their process because:

1. It provides overall investment strategy and specific guidelines that are clearly communicated.
2. It ensures that the risk and return profile is consistent with management practices and expectations.
3. It provides accountability for investment decisions.
4. It explains and illustrates the reason for market price fluctuations in the portfolio.

GASB 31

Before we go on – review of terms and facts for fixed income

- Liquidity versus core funds
 - Core are funds that are available to hold to maturity and can tolerate price fluctuations
 - Ensures that your maturities are diversified which in the long run will smooth out returns.
- Duration – Average Maturity
 - Tool used by fixed income managers to determine the amount of price fluctuation that can be expected given interest rate changes.

Example: Portfolio Size 50,000,000

Duration = 1.5 years

Rates drop 100bp or 1% from 3% to 2%

Mark to Market on portfolio will change by \$750,000

$50,000,000(\text{Size of Port}) * 1.50 (\text{duration}) * .01 (\text{rate change}) = \$750,000.00$

- Components of Return:
 - 85% of return is contributed by duration
 - 15% contribution is from asset allocation choices and yield curve positioning
- Asset Allocation:
 - Treasury
 - Agency Issues
 - Callable Agency Issues
 - Corporate Bonds
 - CMO's
- Total Return: Price + Interest income in any stated period.

WHAT, WHY – NOW HOW?

- Step #1: Determine acceptable risk tolerance
- Step #2: Evaluate return expectations
- Step #3: Establish Appropriate Benchmark
- Step #4: Establish Duration Targets
- Step #5: Determine Asset Allocation
- Step #6: Monitor and report performance

Step #1: Determine Acceptable Risk Tolerance

The longer the maturity the more price volatility the portfolio will incur given changes in interest rates. (Average rate change per year = 200bp)

%Price Change given Yield shifts on \$100MM Portfolio

<i>Index</i>	<i>Duration</i>	100bp+/-		200bp+/-	
		<i>%P</i>	<i>Value</i>	<i>%P</i>	<i>Value</i>
Merrill 0-1 Year	.5	.5%	\$500,000	1%	\$1,000M
Merrill 1-3 Year	1.6	1.6%	\$1,600M	3.2%	\$3,200M
Merrill 1-5 Year	2.2	2.2%	\$2,200M	4.4%	\$4,400M

Step # 2: Evaluate Return Objectives

Looking at historical data will assist in determining expected returns based on varied maturities.

100MLN Invested	3 year ending 12/31/02	5 year ending 12/31/02	YTD 9/30/03
Merrill 0-1 Year	\$14,671M	\$26,890M	\$ 987M
Merrill 1-3 Year	\$23,691M	\$36,397M	\$1,740M
Merrill 1-5 Year	\$26,793M	\$39,002M	\$2,070M

Step #3: Establish appropriate benchmark

Additional criteria for determining appropriate benchmark in conjunction with risk/return profile:

1. Allowable types of securities
2. Time horizon of portfolio- Core Fund
3. Maturity constraints of portfolio- Investment policy

USES OF BENCHMARK:

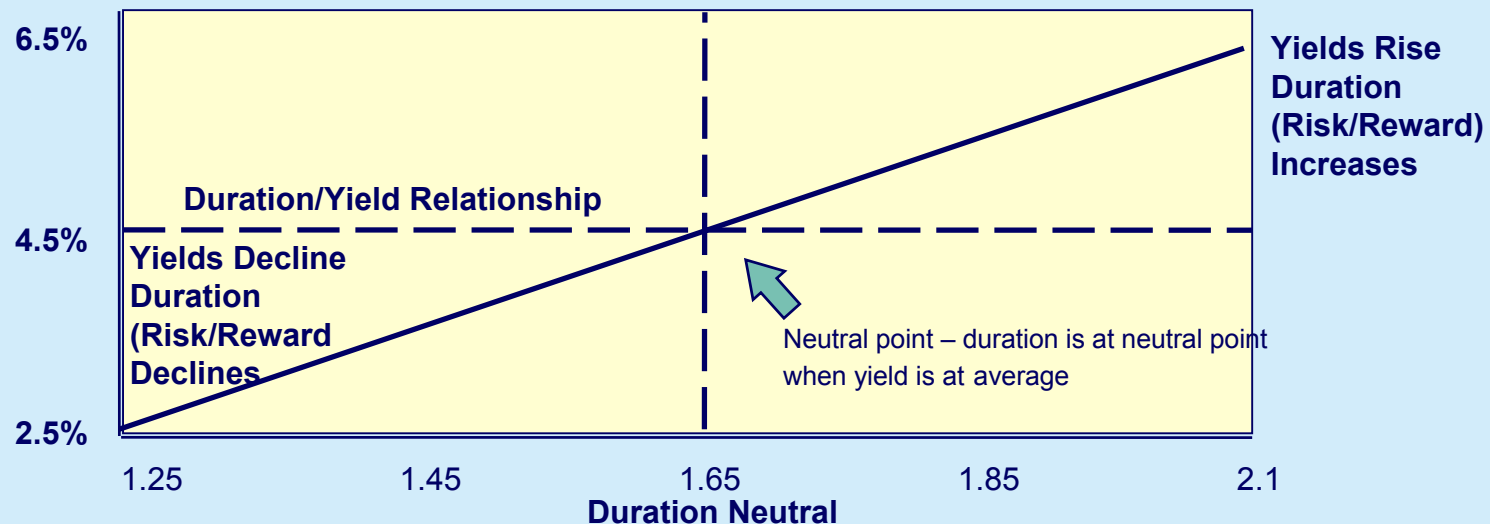
Control Risk: Established benchmark reflects appropriate standard of risk and return in normal rate environment.

Enhance Returns: Performance of overall funds will be enhanced through the decision making process of a disciplined core fund.

Step #4: Establish duration targets

Determine the variation in duration from the benchmark that you are willing to incur.

Graphically chart using 1.65 (Merrill 1-3 Duration) as target and 4.5% (5 year average) on 2 year note.



U.S. TREASURIES

Historical Interest Rate Review- 12/31/02 (Yields at year end for each maturity date)

	<u>2002</u>	<u>2001</u>	<u>2000</u>	<u>1999</u>	<u>1998</u>
3 Month	1.19	1.72	5.90	5.32	4.48
6 Month	1.20	1.79	5.63	5.72	4.52
2 Year	1.74	3.02	4.86	6.21	4.54
5 Year	2.73	4.30	4.75	6.28	4.54

Interest Rate Average Comparison		<u>5 Year</u>	<u>10 Year</u>	<u>Current:</u>
		<u>Average</u>	<u>Average</u>	<u>10/02/03</u>
	3 Month	4.54	4.47	.943
	6 Month	4.44	4.67	.986
	2 Year	4.85	5.18	1.469
	5 Year	5.12	5.62	2.871

Determine Asset Allocation

It is important to monitor variations of the portfolio to the benchmark in respect to duration and asset allocation.

Fundamental Comparison:

Benchmark Merrill 1-3 Year Treas. Index

		Avg	Avg	
	YTM	Cpn	Maturity	Duration
Portfolio	1.885	4.86	2.006	1.876
Index	1.57	4.55	1.667	1.667
Difference	.313	.31	.341	.294

Portfolio Distribution Comparison to Benchmark

		PORT	BNCH MK			PORT	BNCH MK			PORT	BNCH MK
MATURITY YRS	(%)	(%)	DIFF	MATURITY YRS	(%)	(%)	DIFF	EFF DUR	(%)	(%)	DIFF
0.0-1.0	16.6	0	16.6	0.0-1.0	13.1	0	13.1	0.0-1.0	26.6	6.3	20.3
1.0-3.0	69.1	100	-30.9	1.0-3.0	68.2	100	-31.8	1.0-3.0	63.6	93.6	-30
3.0-5.0	11.3	0	11.3	3.0-5.0	13	0	13	3.0-4.0	0	0	0
5.0-10.0	3.1	0	3.1	5.0-10.0	5.7	0	5.7	4.0-6.0	9.9	0	9.9
10.0-20.0	0	0	0	10.0-20.0	0	0	0	6.0-8.0	0	0	0
20.0 +	0	0	0	20.0 +	0	0	0	8.0 +	0	0	0
		PORT	BNCH MK			PORT	BNCH MK			PORT	BNCH MK
SECTOR	(%)	(%)	DIFF	QUALITY	(%)	(%)	DIFF	MKT WEIGHTED COUPON	(%)	(%)	DIFF
TREASURY	17.8	100	-82.2	TSY	17.8	100	-82.2	0.0-5.0	31.6	57.6	-26
AGENCY	82.2	0	82.2	AGY	82.2	0	82.2	5.0-7.0	68.4	28.5	39.9
PASS-THRU	0	0	0	AAA	0	0	0	7.0-8.0	0	8.8	-8.8
CMO	0	0	0	AA	0	0	0	8.0-9.0	0	0	0
CALLS/SINKS/PUTS	PORT	BNCH MK	DIFF	A	0	0	0	9.0-10.0	0	0	0
	(%)	(%)		BAA	0	0	0	10.0 +	0	5.1	-5.1
	NONE	100		CA	0	0	0				
	W/DEF CALL	0		C	0	0	0				
	W/CURR CALL	0		NR	0	0	0				
PRICE TO CALL	0	0	0	OTHER	0	0	0				

Monitor Portfolio compared to benchmark

Monitoring returns and risk to benchmark on monthly basis will assist investment officer in making future investment decisions.

	<i>Returns</i>		<i>Risk</i>	
	Portfolio	Benchmark	Portfolio	Benchmark
7/31/02	1.175%	1.122%	1.48	1.58
8/31/02	.453%	.343%	1.48	1.68
9/30/02	.577%	.826%	1.41	1.63
10/31/02	.345%	-.068%	1.43	1.59
11/30/02	-.149%	-.518%	1.35	1.57
12/31/02	.768%	.376%	1.22	1.59
YTD	3.21%	3.29%		

Strategy

Decision making based on benchmark

Scenario: 100MM portfolio with new cash of 10MM

Current duration is 1.6 years

Benchmark is 1.6 years

2 year yield is at 1.5%

Strategy: You want to get the duration shorter to a 1.40 year level because of historical low rates.

What security duration should you buy?

You need to buy a security shorter than 1.6 years to pull your duration in, so discipline forces you to buy 1-1.25 year paper.

Next determine asset allocation

- Need duration of approximately 1.25 years but can choose between Treasury, Agency and Corporate

Asset Allocation comparison:	1.25 current yields
Underweighted – Treasury	1.25
Overweighted – Agency	1.35
Underweighted – Corporates	1.45

Strategy: Compare spreads and buy either treasury or corporate

Establish Guidelines

Utilizing a benchmark disciplined strategy will assist in communicating a concise plan to the investment committee and board members.

Guidelines can be periodically updated when the market changes.

- **SUMMARY OF CORE FUND MANAGEMENT GUIDELINES**
- **SAMPLE PORTFOLIO**

- **Prepared By: D.A. Davidson & Co.**
- **JANUARY, 2003**

■ Target Size of Core Balance	\$50MM - 100MM
■ Benchmark to Control Risk and	Merrill Lynch 1-3 Year
■ Measure Return	Treasury/Agency
■	Code: G102
■	Duration: Approximately 1.6 Years
■	Asset Allocation: Within Policy
	Maturity Structure: Within Policy
■ Duration Range of Portfolio Relative to	+/- 25% of 1.65 Duration
■ Benchmark	Minimum 1.2 Years
■	Maximum 2.1 Years
■ Asset Allocation Constraints	100% Treasury
■	90% Maximum Agency
■	30% Maximum Callable Securities
■	20% Corporate A or better
■ Strategy and Timeline	Over the next six to twelve months the portfolio will be adjusted to reflect the above guidelines.

Benefits of Utilizing a Benchmark

- Clear sense of direction
- Focus in overall portfolio versus yield
- Accountability to decision making process
- Balances risk and return
- Communication, Communication, Communication
- Confidence and peace of mind

Thank You for Your
Time